

CLAIMS

What is claimed is:

1. An optical line card protection module, comprising:
 - a bench;
 - a user-side interface to an array of user fibers;
 - a device-side interface to an array of device fibers that connect the module to a first device and a second device;
 - a monitoring signal generator on the bench that generates monitoring signals;
 - a monitoring signal detector on the bench that detects the monitoring signals; and
 - a beam switching system on the bench that selectively connects the user fibers to the device fibers for the first device or the device fibers for the second device.
2. An optical line card protection module as claimed in claim 1, wherein the user-side interface and the device-side interface comprise separate fiber mounting blocks for respectively mounting fiber endfaces of the user fibers and endfaces of the device fibers to the bench.
3. An optical line card protection module as claimed in claim 1, further comprising a user-side lens array on the bench between fiber endfaces of the user fibers and the beam switching system.
4. An optical line card protection module as claimed in claim 1, further comprising a device-side lens array on the bench between fiber endfaces of the device fibers and the beam switching system.

5. An optical line card protection module as claimed in claim 1, wherein the monitoring signal generator comprises at least one semiconductor device mounted on the bench.

6. An optical line card protection module as claimed in claim 1, further comprising a generator lens array for directing monitoring signals from the semiconductor device to the beam switching system.

7. An optical line card protection module as claimed in claim 1, further comprising an input tap detector array that is located in a beam path between the user-side interface and the beam switching system for detecting optical signals that are input from the user fibers.

8. An optical line card protection module as claimed in claim 1, further comprising an output tap detector array that is located in a beam path between the user-side interface and the beam switching system for detecting optical signals that are being output to the user fibers.

9. An optical line card protection module as claimed in claim 1, wherein the beam switching system enables input beams from the user-side interface to be transmitted past the beam switching system in a first state and translates the input beams in a second state.

10. An optical line card protection module as claimed in claim 1, wherein the beam switching system enables output beams to the user-side interface to be transmitted past the beam switching system in a first state and translates the output beams in a second state.

11. An optical line card protection module as claimed in claim 1, wherein the beam switching system translates input beams from the user-side interface in a direction that

is perpendicular to an axis of the input beams in response to converting between a first state and a second state.

12. An optical line card protection module as claimed in claim 1, wherein the beam switching system translates output beams to the user-side interface in a direction that is perpendicular to an axis of the output beams in response to converting between a first state and a second state.

13. An optical line card protection module as claimed in claim 1, wherein the beam switching system comprises two opposed tilt mirror arrays.

14. An optical line card protection module, comprising:

- a bench;
- a user-side interface to an array of user fibers;
- a device-side interface to an array of device fibers that connect the module to a primary device and a redundant device;
- a monitoring signal generator that generates a monitoring signal;
- a monitoring signal detector that detects the monitoring signal;
- a beam switching system on the bench that selectively connects the user fibers to the device fibers for the primary device or the device fibers for the redundant device; and
- a user input signal tap detector that is located in a beam path between the user-side interface and the beam switching system for detecting optical signals that are input to the module from the user fibers.

15. An optical line card protection module, comprising:

- a bench;
- a user-side interface to an array of user fibers;

a device-side interface to an array of device fibers that connect the module to a
primary device and a redundant device;
a monitoring signal generator that generates a monitoring signal;
a monitoring signal detector that detects the monitoring signal;
5 a beam switching system on the bench that selectively connects the user fibers to
the device fibers for the primary device or the device fibers for the redundant
device; and
a user output signal tap detector that is located in a beam path between the user-side
interface and the beam switching system for detecting optical signals that are
10 being output to the user fibers.

16. An tap system for an array of optical beams, the system comprising:
a beam splitting substrate that is angled with respect to the optical beams for
reflecting a portion of each of the optical beams; and
an array of detectors, each one of the detectors detecting a reflected portion of one
15 the optical beams.

17. A tap system as claimed in claim 16, further comprising a detector substrate on
which the detectors are installed.

18. A tap system as claimed in claim 17, wherein the detector substrate is attached to
the beam splitting substrate via standoffs.

20 19. A tap system as claimed in claim 17, wherein the detector substrate comprises
optical ports through which the optical beams propagate prior to transmission through
the beam splitting substrate.

20. An optical line card protection module, comprising:
a bench;
25 a user-side interface to an array of user fibers one side of the bench;

a device-side interface to an array of device fibers that connect the module to a first device and a second device on the other side of the bench; and
a beam switching system on the bench between the user-side interface and the device-side interface, the beam switching system selectively connecting the user fibers to the device fibers for the first device or the device fibers for the second device.

5

093631-051001
T0750"TE62960